CLAIMS

We Claim:

1. A cartridge for use in an open nucleic acid synthesis system, said cartridge comprising a plurality of receiving holes configured to hold nucleic acid synthesis columns, wherein said cartridge is further configured to receive one or more O-rings, wherein the presence of said one or more O-rings provides a seal between said nucleic acid synthesis columns and said plurality of receiving holes.

2. A nucleic acid synthesis system containing the cartridge of Claim 1.

3. The cartridge of Claim 1, wherein said plurality of receiving holes comprises 12 or more receiving holes.

4. The cartridge of Claim 1, wherein said plurality of receiving holes comprises 48 or more receiving holes.

5. The cartridge of Claim 1, wherein said cartridge is configured to receive a gasket, wherein said gasket provides said one or more O-rings.

6. The cartridge of Claim 1, wherein said plurality of receiving holes comprise an upper portion and a lower portion, wherein said lower portion comprises a first diameter and said upper portion comprises a second diameter that is larger than said first diameter.

7. The cartridge of Claim 1, wherein said plurality of receiving holes comprise an upper portion with a first diameter, a middle portion with a second diameter, and a lower portion with a third diameter, wherein said second diameter is larger than said first diameter and larger than said third diameter.

8. The cartridge of Claim 7, wherein said middle portion is configured to hold an O-ring such that, when present, said O-ring contains an internal diameter less than said first diameter and less than said third diameter.

9. A system comprising an open-system nucleic acid synthesis cartridge, said cartridge comprising at least one receiving hole configured to receive a nucleic acid synthesis column, said at least one receiving hole comprising an O-ring.

10. The system of Claim 9, wherein said open-system nucleic acid synthesis cartridge comprises a rotary cartridge.

11. The system of Claim 9, wherein said O-ring is configured to form a substantially airtight seal between said at least one receiving hole and said nucleic acid synthesis column, when said nucleic acid synthesis column is present.

12. The system of Claim 9, wherein said O-ring is configured to form an airtight seal between said at least one receiving hole and said nucleic acid synthesis column, when said nucleic acid synthesis column is present.

13. The system of Claim 9, wherein said cartridge comprises a plurality of receiving holes.

14. The system of Claim 13, wherein each of said plurality of receiving holes comprises an O-ring.

15. The system of Claim 13, wherein said cartridge comprises 12 or more receiving holes.

16. The system of Claim 13, wherein said cartridge comprises 48 or more receiving holes.

17. A nucleic acid synthesis system comprising a synthesis and purge component in a pressurizable chamber, said synthesis and purge component comprising a cartridge, wherein said cartridge in configured to hold a plurality of nucleic acid synthesis columns, and wherein said cartridge is further configured to provides seals between said cartridge and each of said plurality of nucleic acid synthesis columns so as to maintain pressure in said chamber during a purging operation to purge liquid reagent from said plurality of synthesis columns, wherein each of said seals between said cartridge and said plurality of nucleic acid synthesis columns is provided by an O-ring.

18. The system of Claim 17, wherein said cartridge is configured to hold 12 or more nucleic acid synthesis columns.

19. The system of Claim 17, wherein said cartridge is configured to hold 48 or more nucleic acid synthesis columns.

20. The system of Claim 17, wherein each of said seals is a substantially airtight seal between said cartridge and said nucleic acid synthesis column.

21. The system of Claim 17, wherein each of said seals is an airtight seal between said cartridge and said nucleic acid synthesis column

22. The nucleic acid synthesis system of Claim 2, further comprising a reagent dispensing station, wherein said reagent dispensing station is configured to house one or more reagent reservoirs, such that reagents in said reagent reservoirs can be delivered to said cartridge.

23. The system of Claim 22, wherein said reagent dispensing station comprises a ventilation tube configured to remove gaseous emissions from said reagent dispensing station.

24. The system of Claim 22, wherein said reagent dispensing station comprises an enclosure.

25. The system of Claim 24, wherein said reagent dispensing station comprises a viewing window configured to allow visual inspection of reagent reservoirs without opening said enclosure.

26. A nucleic acid synthesis system comprising a reagent dispensing station, wherein said reagent dispensing station is configured to house one or more reagent reservoirs, wherein said reagent dispensing station comprises a ventilation port and an enclosure comprising a viewing window, said viewing window configured to allow visual inspection of reagent reservoirs without opening said enclosure.

27. The system of Claim 26, further comprising a ventilation tube connected to said ventilation port.

28. The system of Claim 26, wherein said reagent dispensing station comprises two or more ventilation ports.

29. An open-system nucleic acid synthesis system comprising a reagent dispensing station, wherein said reagent dispensing station is configured to house one or more reagent reservoirs, wherein said reagent dispensing station comprises a ventilation port.

30. The system of Claim 29, wherein said reagent dispensing station further comprises an enclosure comprising a viewing window, said viewing window configured to allow visual inspection of reagent reservoirs without opening said enclosure.

31. The system of Claim 29, further comprising a ventilation tube connected to said ventilation port.

32. The system of Claim 29, wherein said reagent dispensing station comprises two or more ventilation ports.

33. A method of synthesizing nucleic acids comprising:

a) providing:

i) a nucleic acid synthesizer comprising a cartridge and at least one nucleic acid synthesis column, wherein a seal is provided by an O-ring between said cartridge and said at least one nucleic acid synthesis column; and

ii) nucleic acid synthesis reagents;

b) introducing a portion of said nucleic acid synthesis reagents into said at least one nucleic acid synthesis column to provides a first synthesis reaction;

c) purging said nucleic acid synthesis columns by creating a pressure differential across said at least one nucleic acid synthesis columns; and

d) introducing a second portion of said nucleic acid synthesis reagents into at least one of said nucleic acid synthesis columns to provide a second synthesis reaction.

34. The method of Claim 33, wherein said O-ring provides a substantially airtight seal between said cartridge and said at least one nucleic acid synthesis column.

35. The method of Claim 33, wherein said O-ring provides an airtight seal between said cartridge and said at least one nucleic acid synthesis column.